

PHYLOGENETIC PLACEMENT OF *PHAENOCEPHALUS* WOLLASTON
(COLEOPTERA: PHAENOCEPHALIDAE & PHALACRIDAE)

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Abstract.—The taxonomic history of the family Phaenocephalidae is reviewed. This family currently consists of two species, *Phaenocephalus castaneus* Wollaston and *P. coomani* Paulian, described from Japan and Viet Nam respectively. The genus is re-described and selected structures are illustrated. The relationship of this enigmatic family to other beetles has been disputed for years. The uncertainty of its phylogenetic position has been due, in part, to the fact that type material has been unavailable for study for forty years or more. After examining types in collections in London and Paris it seems that these two species, previously attributed to a separate family, should be placed in the Phalacridae.

Key Words: Coleoptera, Cucujoidea, Phaenocephalidae, Phalacridae

The Phaenocephalidae is one of the smallest families of Coleoptera, with only two species described, as well as one of the most enigmatic. Ever since this family was described nearly 100 years ago there have been few published reports for these beetles. While studying types and other material of Cucujoidea recently in London and Paris, I was able to locate specimens of Phaenocephalidae that have likely been unavailable for study for forty years or more. *Phaenocephalus* was not listed in the generic list of Coleoptera at The Natural History Museum, London, and the material at the Muséum National d'Histoire Naturelle, Paris was among Paulian's dissections of Corylophidae which were until recently considered lost or destroyed. It seems appropriate to now review the taxonomic history of these beetles, redescribe the genus, illustrate important structural features, and discuss the phylogenetic position of this family.

Wollaston (1873) described *Phaenocephalus castaneus* as a corylophid based upon a single specimen from Japan. He thought

it was most similar to *Corylophus* Stephens but grouped *Phaenocephalus* with *Sacium* LeConte and *Microstagetus* Wollaston based upon their 11-segmented antennae. Matthews (1899) established a new family, Phaenocephalidae, for Wollaston's species and provided a more detailed description and some illustrations. Both authors emphasized the large, deflexed head and anteriorly emarginate edge of the pronotum in *Phaenocephalus*. Matthews, however, thought these features, as well as others, were sufficient to exclude this species from Corylophidae. He speculated that Phaenocephalidae was a link between Corylophidae and Silphidae.

Paulian (1950) described another species of *Phaenocephalus*, *P. coomani*, from Viet Nam and illustrated a few structures. In a footnote he indicated that he had seen additional material of an undetermined species of *Phaenocephalus* from Sumatra; I was unable to locate this material. I did find, however, a specimen labelled as *Phaenocephalus* sp. from Viet Nam, but this is re-

ally a species of *Orthoperus* Stephens (Corylophidae).

There are few subsequent references to this family, and these were presumably made without referring to type material. Crowson (1955) treated Phaenocephalidae as Coleoptera *incertae sedis*, Lawrence (1982) considered this family synonymous with Phalacridae, and Sasaji (1985) included a photograph of *Phaenocephalus castaneus* and treated it as a distinct family of Cucujoidea.

The quality of preserved material for this family is extremely poor. Wollaston's type of *Phaenocephalus castaneus* is virtually lost; the only parts that I could find were the labium and a maxilla mounted in balsam on an acetate card. These structures agree with Matthews's (1899) illustrations. All of Paulian's material, including the type of *P. coomani*, were poorly mounted on slides and still in glycerin jelly. These specimens have been removed from their slides and transferred to glycerin-filled microvials. There are few features that can be compared to Wollaston's or Matthews's descriptions of *P. castaneus*.

I have examined the following material of *Phaenocephalus*:

P. castaneus.—The labium and a maxilla of the holotype. The number and date "759/Aug 5 1885," written by Matthews, is attached to the pin. Two slide-mounted specimens from Japan were used for Paulian's (1950) monograph. One specimen is represented by the head only. Paulian (in litt., 1990) never examined Wollaston's type, so these may not be conspecific. The specimen that Paulian listed from Formosa in the Grouvelle collection was not found. I have an additional specimen from Japan identified by H. Sasaji. Most of the illustrations included in this paper were made from this specimen and compared to previously published descriptions and illustrations. This specimen is in my collection.

P. coomani.—The slide-mounted type described by Paulian was the only material

available. This type consists of the head and prothorax; the rest of the specimen appears to be lost. This is likely a syntype since Paulian lists the size of this species as 1.15–1.20 mm long, suggesting more than one specimen was used for his description. I am not designating a lectotype with the hope that the remaining type material for this species will eventually be located.

REDESCRIPTION OF *PHAENOCEPHALUS* WOLLASTON

The following description is based upon the material listed above. Certain features, such as total body length, were taken from descriptions. Most details are described from the specimen of the putative *P. castaneus* that is in my collection. Every effort was made to compare these features to previously published descriptions and illustrations, as well as the preserved material listed above. It is possible that this description is inaccurate since the type of the type species of this genus is almost entirely lost. In general, this agrees with Matthews's (1899) description, except that the mesocoxal cavities are clearly closed and the ventrites are subequal in length.

Description.—Length 1.15–1.70 mm. Body ovate, about 1.3× longer than wide, light brown, glabrous, shiny; dorsum convex, venter flat.

Head (Fig. 3) transverse, widest at eyes. Eye on antero-lateral margin of cranium. Fronto-clypeal suture absent, clypeus strongly declivous anteriorly. Antenna 11-segmented with 3-segmented club, apical club segment elongate, subequal in length to basal two club segments combined; antennal groove indistinct. Labrum (Fig. 4) transverse, sclerotized, on different plane from clypeus; tormae (Fig. 4) elongate, slightly longer than labrum, fused apically with labial rods, with mesal arms directed anteriorly; epipharyngeal rods (Fig. 4) subequal in length to mesal arms of tormae, fringed with setae mesally. Mandible (Fig. 5) bifid apically; mola well-developed; pros-

theca broad, fringed with hairs, with a small basal tuft of setae. Maxilla (Fig. 6) with 4-segmented palp, segment 4 longest; galea broad, distigalea with dorsal membranous area basally, with broad brush of elongate setae apically; lacinia narrow, bifid apically. Labium (Fig. 8) with 3-segmented palp, segments 2 and 3 subequal in length; mentum transverse, anterolateral angles produced; prementum mostly membranous, basal sclerite small, ligula large, divergent apically with distinct lobes, labial rods elongate, fused apically with tormae. Gular sutures indistinct. Tentorium reduced, represented by vestigial anterior arms only.

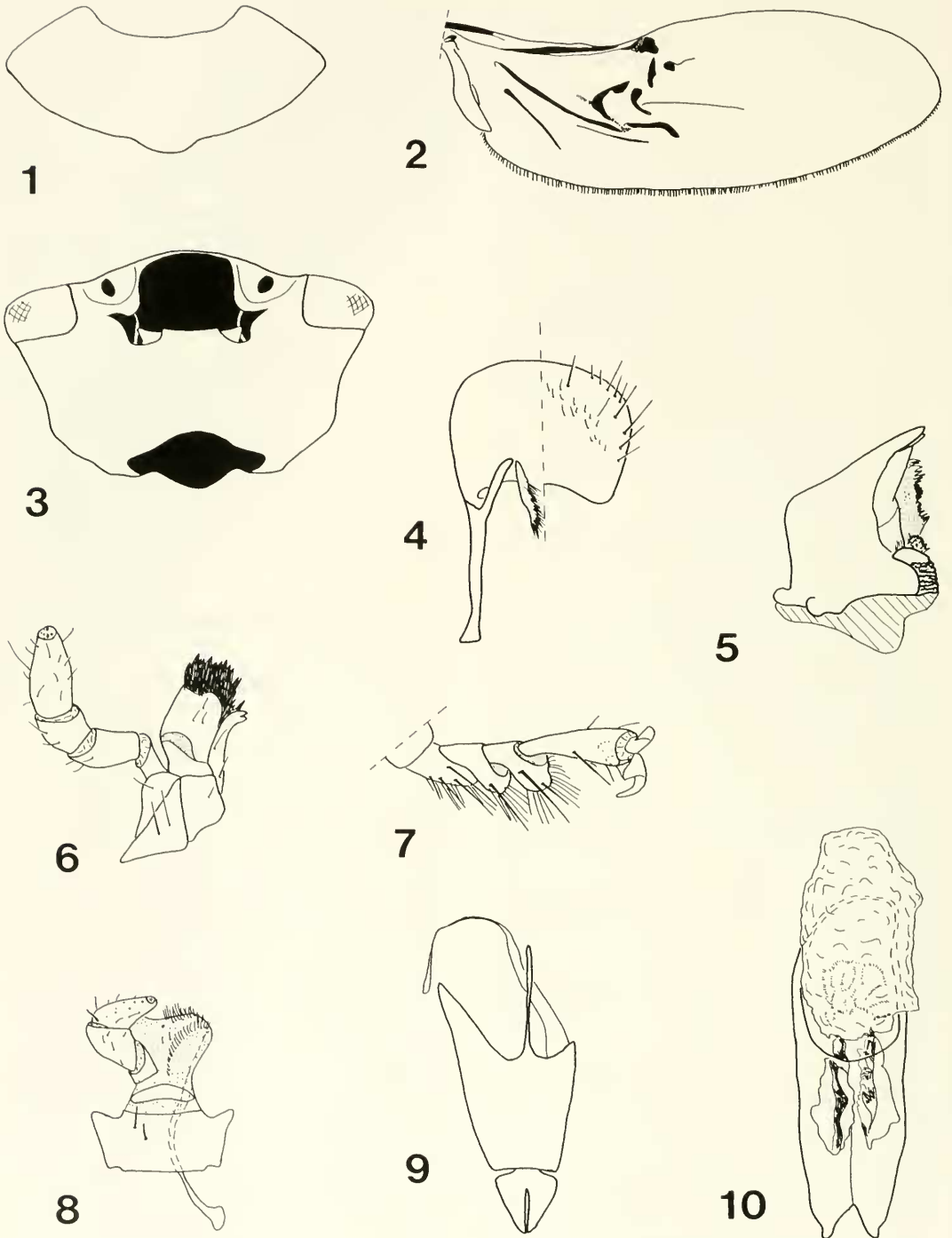
Pronotum (Fig. 1) transverse, about $0.4 \times$ longer than wide, anterior edge with deep U-shaped emargination, posterior edge with large medial lobe, lateral edges convergent anteriorly, with smooth margins. Prosteronum reduced anteriorly; intercoxal process narrow, elevated, deflexed apically. Procoxa globose, with long internal extension, its cavity internally closed, externally widely open. Mesosternum between coxae subequal in width to mesocoxal cavity, without femoral lines, junction of meso- and metasternum straight-line type, without internal knobs. Mesocoxa globose, trochantin concealed, its cavity laterally closed. Metasternum twice as wide as long, without femoral lines, with medial line extending to middle, with posterior edge deeply notched medially. Metacoxa large, transverse, almost contiguous. Metendosternite with furcal arms divergent at about 90 degree angle, anterior tendons short, curved laterally at apex. Leg with trochanter small, subtriangular; femur widest at middle, progressively longer posteriorly, fore and midfemur slightly longer than tibia, hind femur subequal in length to hind tibia; tibia elongate, subcylindrical, with numerous stout spines, especially along posterior edge, tibial spur formula 1-2-2, fore spur short, stout, barely longer than tibial spines, midspurs distinct, unequal in length, hindspurs distinct, subequal in length; tarsi (Fig. 7) 4-4-4, all tarsi

subequal in length, segments 1-3 distinctly lobed, 4 elongate, subequal in length to 1-3 combined; claws with large, broad tooth at base, empodium absent. Scutellum small, triangular. Elytra about $3.2 \times$ longer than pronotum, punctation minute, distinctly seriate, with 9 interneurs, intervals smooth except for extremely fine, seriate punctures; epipleuron large, strongly angled, complete. Wing (Fig. 2) with venation reduced, cells and a subcubital fleck absent, with 2 anal veins, jugal lobe present.

Abdomen with 7 spiracles; 5 ventrites subequal in length, first with large, narrow intercoxal process; femoral lines absent; all ventrites free; 2-5 with small, anterolateral internal apodemes. Male genitalia with tegmen (Fig. 9) elongate, with apical subtriangular sclerite deeply emarginate medially, median lobe (Fig. 10) weakly sclerotized.

I agree with Lawrence's (1982) decision to synonymize *Phaenocephalidae* with *Phalacridae*, although he did this based upon published information only (J. F. Lawrence, pers. comm.). In general habitus, *Phaenocephalus* is certainly a typical phalacid. Its lack of a fronto-clypeal suture, maxilla with distinct lacinia and galea, broadly open procoxal cavities, laterally closed mesocoxal cavities, 4-4-4 tarsi distinctly lobed with dentate claws, and subequal ventrites are sufficient to exclude *Phaenocephalus* from all other families of Cucujoidea except Phalacridae. With the shape of the tegmen and the almost completely reduced tentorium it seems that this genus can easily be included in this family. Moreover, I have observed elongate tormae fused apically with elongate labial rods only in other phalacrids. This condition has not, to my knowledge, been reported previously for cucujoids. It may be related to the reduced tentorium or it may be a useful phylogenetic character at another level.

The only other phalacid with similar tarsi and tarsal claws is the Australian *Phalacrinus* Blackburn. Species that I examined, however, are larger than *Phaenocephalus*, the



Figs. 1-10. *Phaenocephalus castaneus*. 1, Pronotum. 2, Wing. 3, Cranium, ventral. 4, Labrum, left side ventral, right side dorsal. 5, Mandible. 6, Maxilla. 7, Tarsus. 8, Labium. 9, Tegmen. 10, Median lobe.

elytral punctures are more distinct, without punctuation on the intervals, and the lateral margins of the elytra are distinctly and sometimes broadly explanate. It is likely that these two genera are sister groups or that they should eventually be synonymized.

Although the phylogenetic importance of some of these features is still uncertain, it is reasonable to include *Phaenocephalus* in Phalacridae until a comprehensive phylogenetic arrangement of this family is proposed. Even with such a system, the precise position of this genus will be tentative until the remainder of the types are discovered. Then we may more confidently discuss the placement of *Phaenocephalus* by utilizing specimens that have been compared with this material.

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